

WHAT IS CLAIMED IS:

1. A catheter for insertion into a body lumen over a guidewire, comprising:
a catheter shaft having a proximal end and a distal end and an interior surface and an exterior surface, said interior surface defining a non-circular guidewire lumen, said non-circular guidewire lumen defined by a plurality of alternating arms and nodes;
a cut extending between said interior surface and said exterior surface of said catheter shaft, said cut being disposed at an apex of one of said guidewire lumen arms, said apex positioned where a distance between said interior surface and said exterior surface of said catheter shaft is at a minimum; and
a guide member, wherein said guide member opens and closes said cut such that when the catheter is tracked over a guidewire, the guidewire is removable from said guidewire lumen of said catheter shaft via said guide member.
2. The catheter of claim 1, wherein said catheter shaft comprises a first material and said crown portions comprise a second material that is different from said first material.
3. The catheter of claim 2, wherein said second material has a lower coefficient of friction than said first material.
4. The catheter of claim 2, wherein said second material is high density polyethylene.
5. The catheter of claim 2, wherein said first material is nylon.
6. The catheter of claim 1, wherein said exterior surface of said catheter shaft includes a plurality of indentations, each of which inwardly extends towards one of said arms.

7. The catheter of claim 6, wherein said plurality of indentations provide open area between said exterior surface of said catheter shaft and a guide catheter when the balloon catheter is inserted therein.
8. The catheter of claim 1, further comprising an inflation lumen extending through at least one of said nodes.
9. The catheter of claim 8, further comprising an inflatable balloon attached to said distal end of said catheter shaft such that said balloon is in fluid communication with each said inflation lumen.
10. The catheter of claim 8, further comprising a coaxial catheter shaft attached to a distal end of said catheter shaft, said coaxial shaft defining a distal guidewire lumen surrounded by a distal inflation lumen, such that said distal guidewire lumen is in fluid communication with said non-circular guidewire lumen and said distal inflation lumen is in fluid communication with each said inflation lumen.
11. The catheter of claim 10, further comprising an inflatable balloon attached to said distal end of said coaxial catheter shaft such that said balloon is in fluid communication with said distal inflation lumen.
12. The catheter of claim 1, wherein said guidewire lumen is defined by three or more nodes.
13. A catheter, comprising:
 - a distal section and a proximal section,
 - said distal section having a distal catheter shaft and a distal guidewire shaft disposed coaxially within said catheter shaft, said distal catheter shaft having an interior surface and an exterior surface and said distal guidewire shaft

having an interior surface and an exterior surface, wherein said interior of said distal guidewire shaft defines a distal guidewire lumen and a distance between said exterior surface of said guidewire shaft and said interior surface of said distal catheter shaft defines a distal inflation lumen,

said proximal section having a proximal catheter shaft including an interior surface and an exterior surface, said interior surface having a plurality of alternating arms and nodes and defining a proximal guidewire lumen and having a proximal inflation lumen disposed within at least one of said nodes,

said distal section being bonded to said proximal section, such that said distal guidewire lumen is in communication with said proximal guidewire lumen and said proximal inflation lumen is in fluid communication with said distal inflation lumen.

14. The catheter of claim 13, wherein said distal guidewire shaft has proximal and distal ends and said proximal guidewire lumen has proximal and distal ends, said proximal end of said distal guidewire shaft being inserted into said distal end of said proximal guidewire lumen, such that, where inserted, said exterior surface of said distal guidewire shaft is bonded to crowns of said nodes of said interior surface of said proximal catheter shaft.

15. The catheter of claim 13, wherein said distal catheter shaft has proximal and distal ends and wherein said proximal catheter shaft has proximal and distal ends, said distal end of said proximal catheter shaft is inserted into said proximal end of said distal catheter shaft, such that, where inserted, at least a portion of said exterior surface of said proximal catheter shaft is bonded to said interior surface of said distal catheter shaft.

16. The catheter of claim 13, wherein said distal section is shorter than said proximal section.

17. The catheter of claim 13, further comprising:
a cut extending between said interior surface and said exterior surface of said proximal catheter shaft, said cut being disposed at an apex of one of said arms, said apex positioned where a distance between said interior surface and exterior surface of said proximal catheter shaft is at a minimum; and
a guide member, wherein said guide member opens and closes said cut such that, when the catheter is tracked over a guidewire, the guidewire is removable from said proximal guidewire lumen of said proximal catheter shaft via said guide member.
18. The catheter of claim 13, wherein said proximal catheter shaft comprises a first material and crowns of said nodes comprise a second material that is different from said first material.
19. The catheter of claim 18, wherein said second material has a lower coefficient of friction than said first material.
20. The catheter of claim 18, wherein said second material is high density polyethylene.
21. The catheter of claim 18, wherein said first material is one of nylon or PEBAX.
22. The catheter of claim 13, wherein said distal catheter shaft and said distal guidewire shaft comprise a first material and said proximal catheter shaft comprises a second material.
23. The catheter of claim 22, wherein said first material is PEBAX or nylon.

24. The catheter of claim 22, wherein said second material is high density polyethylene.

25. The catheter of claim 13, wherein said exterior surface of said proximal catheter shaft includes a plurality of indentations, each of which inwardly extends towards one of said arms.

26. The catheter of claim 25, wherein said plurality of indentations provide open area between said exterior surface of said proximal catheter shaft and a body lumen when the balloon catheter is inserted therein.

27. The catheter of claim 13, further comprising an inflatable balloon attached to a distal end of said distal catheter shaft such that said balloon is in fluid communication with said distal inflation lumen.

28. The catheter of claim 13, wherein said proximal guidewire lumen is defined by three or more nodes.

29. A method for making a catheter comprising the steps of:
extruding a guidewire shaft defining a first guidewire lumen and having proximal and distal ends;
extruding a first catheter shaft having proximal and distal ends;
extruding a second catheter shaft having proximal and distal ends, said second catheter shaft having an interior surface defined by alternating arms and nodes, said interior surface defining a non-circular second guidewire lumen, and a plurality of first inflation lumen, wherein each of said plurality of first inflation lumen are disposed within one of said nodes;
inserting cylindrical mandrels into said first guidewire lumen and each said first inflation lumen;

bonding the proximal end of said guidewire shaft to said distal end of said second catheter shaft; and

bonding said proximal end of said first catheter shaft to said distal end of said second catheter shaft.

30. The method of claim 29, wherein an exterior surface of said guidewire shaft is bonded to crowns of said nodes of said interior surface of said second catheter shaft.

31. The method of claim 29, wherein an interior surface of said first catheter shaft is bonded to an exterior surface of said second catheter shaft.

32. The method of claim 29, wherein said bonding occurs by a method selected from the group consisting of laser welding, heat welding, cementing, and adhering with an adhesive.

33. The method of claim 29, further comprising bonding a balloon to said distal end of said first catheter shaft.